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**New Species of North American CYNIPIDÆ.**

BY H. F. BASSETT.

Ten years ago I published an article in the *TRANSACTIONS* describing forty-one new species of gall-flies. In that article I stated that I had still a considerable number of undescribed species. Since then some new species have been found, and some specimens have been reared from galls I have long known, and it happens that my paper contains descriptions of forty-one species, but the number was not intentionally the same.

I still have some material in hand, but it is doubtful whether my studies of the Cynipidæ will ever be carried any further.

I trust the infirmity of failing eyesight has not prevented a fairly good execution of a task at all times difficult; but I gladly leave to younger men a work that has for forty years had most of my leisure, and has always been an unfailing source of purest happiness.

***Antistrophus leavenworthi* n. sp.**

The galls of this species are immense enlargements of the stalks of some plant of the order Compositæ, probably of the genus *Lactuca* or *Mulgedium*.

My friend, Mr. F. Leavenworth, of Petersburg, Va., from whom I received the specimens, informs me that larger galls occur than those sent, though the largest of these measures between four and five inches in diameter. They are unevenly globular. The flies live over Winter in the galls.

Gall-fly.—*Male*.—Body black. Antennæ fourteen jointed, first black; second dark brown, globose; third of moderate length, club shaped, the following joints dusky reddish brown, all nearly equal in length. Head minutely punctate. Collare very broad and with the mesothorax rather coarsely punctate. Parapsidal grooves and a strong median line continuous from the collare to the scutellum. Scutellum large and rugose. Fovæ large, deep and smooth. Abdomen smooth, shining; first segment (second?) two-thirds of the entire length. Legs very dark reddish brown. Wings hyaline. Veins pale, slender and absolutely colorless throughout. Radial area open, broad. Areolet wanting. Body .12, antennæ .10, wings .11.

*Female*.—Antennæ thirteen jointed, thirteenth very long. Body in bulk considerably larger than the male. Legs less dark. Female .14, antennæ .10, wings, .12.

Three males and eighteen females in my collection.

Mr. W. H. Ashmead kindly determined the generic place of this species. Named for Mr. Leavenworth, to whom I am indebted for the species.

**Andricus (Callarhytis) tuberosa** n. sp.

Galls.—Woody, polythalamous, growing on *Q. ilicifolia* and reaching maturity in June. They are the young shoots of this oak, checked in their terminal growth, by the sting of the insect. They resemble the galls of *A. scitulus* B., but more closely those of *A. tectus* B. The largest are not more than  $\frac{5}{8}$  of an inch in length and  $\frac{1}{4}$  in diameter. They are quite rare.

Gall-fly. *Male*.—Black. Antennæ fifteen jointed, first and second joints thick, ovate, first dark brown at the base, lighter above; second and the six or seven following yellowish brown, remaining joints dusky, the third joint is curved but not incised. Head punctate. Thorax obscurely wrinkled as seen under a strong magnifier. Pleuræ beautifully striate. Parapsides fine and very distinct. Scutellum finely rugose; fovæ small. Abdomen small, briefly petiolate. Legs brownish yellow. Wings hyaline, and with a microscopic pubescence. Veins pale, areolet distinct; cubitus slender, and reaching to the first transverse vein. Radial area open, broad. Body, .06; antennæ, .06; wings, .09.

*Female*.—Antennæ thirteen jointed, first and second globular, all pale brown, towards the apex becoming somewhat dusky brown, all the joints are very short. Head, thorax and scutellum as in the male. Legs paler brown and more uniform in color than those of the male. Abdomen briefly petiolate; second segment large. Wings as in the male but shorter. Body .07, antennæ .05, wings .08.

Waterbury, Conn. Not abundant.

**Andricus pruinus** n. sp.

Galls.—.12 to .15 of an inch in diameter, perfectly round and variously situated on the leaves, and occasionally on the sterile aments of *Q. obtusiloba*. Outside they are densely pruinose, and the walls are very thin. There is no larval cell. In many instances the blade of the leaf, or the part affected by the gall, is reduced to a mere rudiment of irregular form and varying size, but in such cases the gall is always banded by a minute ridge answering to the leaf blade. It bears a rather close resemblance to *A. utricula* B.

Gall-fly. *Female*.—Shining black. Antennæ thirteen jointed, first and second very minute and light brown, all the following gradually shorter to the apex which is dusky brown. In a few specimens there is a faint suture in the thirteenth joint. Thorax narrow or subcompressed, finely punctate and with a few scattered hairs. The two median lines and the parapsides all even and distinct. Scutellum microscopically wrinkled; fovæ small, deep and shining. Abdomen large; second segment very long, almost tubiform and covering all the others in the dry specimens. Legs dark translucent brown but paler at the joints and tarsi. Wings subhyaline. Veins not heavy but distinct in the basal portion of

the wing but hardly traceable above. Radial area open and short. Areolet very small, the upper side bounded by a longer vein than the others which gives it a squat appearance, which is quite unique. The cubitus reaches half-way to the first transverse. Body .10, antennæ .09, wings 10.

*Female*.—Body .10; antennæ .08; wings .11.

Collected by myself on East Rock, New Haven, Conn., May 7?

***Andricus parmula* n. sp.**

Galls.—Minute, flat, saucer shaped, with a slight elevation in the center. This central portion is the small larval cell. They are sessile on the under side of the leaves of a species of oak unknown to me. They are only .08 of an inch across the top, and are of a fine red color. They are, in habit, very much like a species found on *Q. alba*, but are very much smaller, and the white oak gall is a pale blue color. I am not sure that the white oak gall has yet been reared. There are several other species that somewhat resemble this one. I received these galls from Mrs. E. H. King, of Napa City, California.

Gall-fly.—A female cut out of a dry gall. The crumpled wings and compacted body make description rather difficult. Head dark brownish red. Antennæ thirteen jointed, first large, dark brown, second large, lighter color than the first, the following shorter and gradually darker to the last five which are dusky brown. Entire body bright red. Thorax finely punctate. Parapsides fine but distinct, and diverging far less than in other species. Abdomen finely polished. Legs red. Wings colorless, as are also the veins, except the second transverse and the subcostal. Radial area is scarcely discernible, but is open. Areolet wanting. Body .08; antennæ .07; wing .08.

***Andricus patiens* n. sp.**

Fifty or more individuals captured in early Spring in the act of ovipositing in the buds of *Q. ilicifolia*. They were taken when the temperature was so low that a heavy overcoat was needed to keep one comfortable, and a stiff northeast wind prevailed, and the buds showed no signs of life.

These insects must be strangely insensible to cold, or be driven by an irresistible impulse to deposit their eggs, or they would not brave such inclement weather.

Gall-fly.—Head small, very dark red, hairy and rugose, vertex flattened. Antennæ fourteen jointed, first dark, heavy and club shaped, second stout and one-third the length of the first and of a lighter color; third equal to the first two; fourth, fifth and sixth gradually shorter, the following short and of equal length. All except the first are a dusky red, that under the magnifier becomes of a bright coppery hue. Thorax and scutellum dull red and covered with extremely fine, short hairs that really are little more than a coarse pubescence. Parapsides,

median lines and lines over the base of the wings all present but not very distinct. The median lines reach about one-third the distance from the collar to the scutellum. The head and entire thorax have, to the naked eye, a dull ashy red appearance. Scutellum small; fovæ widely separated, not smooth and shining. Abdomen black, very smooth; first segment with a few scattered hairs on its anterior half. Legs clear, semi-translucent red. Femur of the posterior pair large in the middle, almost ovate. Ungues long, dark and slender. Wings rather large, faintly fuscous; veins—the larger are very pale red, the smaller almost or quite colorless. Radial area open, and by a slight incurve in the radial vein the area is broadest in the middle. Areolet present, the anterior sides bounded by very fine colorless veins. Cubitus short. Body .12, antennæ .09, wings .15.

This species differs from *A. operatola* Riley and Bassett in having fourteen jointed antennæ, head and thorax darker red, smoother surface and a more dense hairiness or pubescence of the mesonotum. The finer thoracic lines, the unpolished fovæ and in the medium sized but distinct areolet, also in the smaller size. All my specimens are remarkably uniform in size and appearance.

**Andricus perditor** n. sp.

The acorns of *Q. ilicifolia* are, as is well known, two years in reaching maturity. In the Spring of the second year they are still very small, hardly as large as a coriander seed. At this time ants are often seen hurrying about among the young acorns and feeding upon a liquid that exudes from some of the acorns. The affected acorns are really galls—transformed acorns—that differ little in form and color from the unaffected acorns. The larva of a gall-fly lives in each of these pseud acorns. Its larval growth is complete in Spring or early Summer. I have never found them very abundant though they appear quite constantly from year to year. I have so far succeeded in rearing only a single gall-fly, and in this specimen, cut from the gall, the wings are not fully expanded.

This fly is a female and probably one of the agamous class whose bisexual form is not yet discovered.

Gall-fly.—Head, antennæ and legs deep brownish red. The head finely punctate. Mesothorax darker than the head and scutellum. Antennæ fourteen jointed, first long and ovate, second short, subquadrate, third and fourth nearly equal, fifth and the following short. Mesothorax transversely and unevenly rugulose, and with short, scattered and closely appressed hairs. Parapsides very slender and subobsolete anteriorly. The usual parallel, intermediate lines faint and ending half way to the scutellum. Lines at the base of the wings present but indistinct. Scutellum long and narrow, ending in a blunt, rounded point. It is rugose and hairy. Fovæ small and rather widely separated. Abdomen black and polished. The second segment is fully three-fifths of the entire length.

A few extremely minute hairs on the sides of this segment close to the anterior margin. Legs light brown at the joints. Wings large, veins dark brown, areolet wanting, radial area open. Gall .12 to .15 long (base to apex), .10 to .12 broad. Base broad, apex cone shaped. Base with the cicatrix of a true acorn.

**Andricus pulchellus** n. sp.

Gall-fly.—A female found ovipositing in the buds of *Quercus prinoides*. Black and glistening. Head small. Antennæ fourteen jointed, slender, dark reddish brown, first joint medium size, globose, second very small, the following short and of uniform length. Thorax ovate, punctate, sparsely hairy, hairs fine. Parapsides large, closely converging, both on the collare and the scutellum. Scutellum small; foveæ rather widely separated, small and shining. Abdomen short; first segment long, four-fifths of the entire length, black and smooth. Legs clear reddish brown. Wings large, veins pale brown, very slender. Radial area open. Areolet large and bounded by veins of uniform size. Cubitus indistinct and reaching half way to the first transverse. Body .10, antennæ .09, wings .14.

**Andricus piperoides** n. sp.

Galls from one-eighth to three-eighths of an inch in diameter, in dense clusters along the mid-vein of full grown red oak leaves (*Quercus rubra*). They are found only on the largest leaves of the thriftiest shoots of young oaks. The clusters contain from one or two dozen galls up to a hundred or more, and extend along the vein two, three or even four inches. The vein is considerably enlarged, and is often split by the crowding of the galls as they increase in size. The blade of the leaf is often torn by the same force and the galls appear on both surfaces. When on the tree they are covered with a dense, coarse pubescence which is, in color, a dusky drab, or when exposed to the sun a brownish red. They are round except a very slight elongation at the point of attachment to the leaf. After falling to the ground they soon turn black, and after losing their pubescence they resemble quite closely small black pepper corns. At this time they are a solid mass of vegetable cells with a minute jelly-like center, which is the undeveloped larva. The growing larva devours the gall till at maturity nothing remains but a thin shell.

My galls were collected in October and were kept until late the next Summer under conditions as nearly normal as possible. As the flies seemed mature in August I placed the galls in dry boxes, expecting the insects would soon appear.

During October and November I removed from the galls some two hundred insects. They were somewhat torpid but seemingly mature. These were alive in January of the next year, and those

in the galls had undergone no change. A few individuals emerged from the galls in the Winter, though most remained alive in the galls many months after.

Gall-flies all females. Entire insect dark reddish brown. Head microscopically punctate. Antennæ fourteen jointed, first of moderate length, second short, ovate, third one-third longer than the first two, fourth to the seventh gradually shorter, the following short and ovate. Thorax smooth, shining, mesothorax with broad, deep parapsidal grooves. Scutellum subquadrate, finely rugose; foveæ broad, distinct, the carina small, but extending to the posterior margin of the scutellum. Abdomen large, compressed laterally so as to give to the dorsal and ventral edges a knife-like sharpness. It is entirely smooth, except a few minute hairs on the sides of one of the terminal segments (the last but one). Legs less dark than the rest of the body. Wings large, veins distinct. Areolet obsolete or nearly so, reduced to a very small light spot at the crossing of the heavy veins. Cubitus extends almost to the first transverse. Radial area open, its broad basal vein stopping abruptly at a distance from the costal border. Body .14, antennæ .10, wings .16.

The extremely slow development of this species gave an opportunity to study the changes as they took place.

**Andricus operatola** Riley and Bassett (Manuscript ?).

I cannot find that Prof. C. V. Riley ever published a full description of this gall and gall-fly, and this is, undoubtedly, the agamous form of *operator* O. S., to which he gave the manuscript name above given. He reared the gall-fly from galls which he and myself collected near my home in Waterbury, Conn., in the Autumn, and the next Spring he sent me specimens of the flies which he had reared, and he referred to the species in different writings, I think. But nothing, so far as I can learn, like a full description has ever been published. I have written a full account of the discovery of *A. operator* ovipositing in the acorns and of the development of the galls therefrom, which was published in the Proc. Ent. Soc. Phila., in 1864; but I give here only the characters necessary to its identification. The galls are produced from the eggs of *A. operator* O. S., who deposits them at or near the base of the young acorns of *Q. ilicifolia*. The ovipositor is thrust down between the acorn and the acorn cup, and in due time the gall is developed. The galls reminds one of the pseud chestnuts that are often seen in the chestnut burrs, being flattened and rarely approaching the shape of an acorn. From one to five or six of these are found in an acorn and they vary greatly in size, from that of a flax-seed to one-third of an inch in length. The acorn is, in most cases,

aborted, and the galls that mature (many are destroyed by parasites) fall to the ground. The larvæ at this time are nearly or quite grown, and early in the Spring following, a part of them have become imagoes. Another part remain in the larval state another year, while a few remain in this condition still longer, and, as suggested by Professor Riley, may develop the third year. I know one other of our agamous species that makes the continuance of the race sure by similar means.

Gall-fly.—Head, antennæ, thorax and legs dark red. Head very broad and curved back, almost crescent shaped, very finely rugose. Antennæ thirteen jointed, first dark, heavy, second very small, globose, and only one-third as long as the first, third not heavy, nor quite as long as the first two, fourth to twelfth gradually shorter, thirteenth long and tapering to a point. Thorax finely punctate. Parapsides very fine, as are also the two intermediate lines. These extend a little more than half way to the scutellum, and are posteriorly, very slightly divergent. Lines over the base of the wings distinct, though minute hairs somewhat obscure the lines and punctuation of the thorax. Scutellum roundish, small, faintly rugose and more hairy than the thorax; fovæ oval, shining, oblique and separated by a broad carina. Abdomen black, polished, first segment very large, its sides sparsely covered anteriorly with small white hairs. Legs paler red than the thorax. Wings hyaline, veins not large, the subcostal and two transverse smoky brownish red, others nearly or quite colorless. Radial area long. Areolet obsolete, cubitus faint and short. Body .14, antennæ .12, wings 18.

**Andricus obtusilobæ** n. sp.

Gall-fly. *Female*.—Head, antennæ and legs a clear yellowish red. Antennæ thirteen jointed, first joint slender, club shaped, second one-half as long, and the third equal to the first, following gradually shorter to the thirteenth, which is twice as long as the twelfth. Head broader than the thorax. Eyes and ocelli black. Vertex evenly and finely wrinkled or punctate. Thorax—the two median and parallel lines are faint and extend half way to the scutellum. The parapsides present but indistinct. General surface of the mesonotum punctate. Scutellum finely rugose; fovæ small, shallow and smooth. Abdomen polished and, posteriorly, darker than the thorax. The tarsi of the posterior pair of legs are also darker than the others. Wings not quite hyaline, veins faint. Radial area open. Areolet wholly wanting, cubitus slender, but reaching two-thirds the distance to the first transverse vein. Body .10, antennæ .06, wings .08.

Galls unknown. The two individuals I have being found in the breeding box with my *A. pruinosis*. I do not recall a species that very closely resembles this in color. It is much paler and smaller than *A. ? operator* O. S.

**Andricus Kingi** n. sp.

*Gall*.—A broad, ovate, saucer-shaped base terminating in a small, slender cone with incurved sides. The point of the cone is open down to the flattened larval cell which lies close to the base of the



gall. The surface is closely pubescent and of a smoky gray color. They are about one-fourth of an inch long and one-fifth in diameter across the widest part of the base or rim of the saucer. The leaves to which they are attached are those of *Q. alba*, I think.

Gall-flies.—Two females bred from galls sent me by Mr. E. H. King, of Napa City, Cal. Head and thorax brownish red. Eyes and ocelli black. Antennæ dusky brownish red, fourteen jointed, or the thirteenth long and quite distinctly annulate, first and second equal in length, the first clavate, the following gradually shorter to the thirteenth. Thorax microscopally punctate and with a few minute hairs. Parapsides—small and indistinct. Scutellum heavy, coarsely punctate; fovæ subobsolete, or rather replaced by two dark, round, hairy, scarcely depressed spots. Abdomen red, approaching black, a very few, widely scattered hairs on the sides of the basal half of the first segment. Legs slender, brownish red. Wings large, hyaline, veins slender, pale brownish red. Radial area open, long and narrow. Areolet well defined by very small veins. Cubitus pale, reaching less than half way to the first transverse. Body .10, antennæ .08, wings .14.

Mrs. E. H. King has sent me several Cynipidæ, and I take pleasure in giving her name to this fine species.

**Andricus incertus** n. sp.

No galls. One gall-fly taken ovipositing April 22, 1890, in buds of *Q. bicolor*.

Head black, broad. Antennæ fourteen jointed, first shining black, clavate, second very large, ovate, third one-half longer than one and two together, fourth equal to one and two, the following gradually shorter, all dark brown. Thorax black, rough and hairy. Parapsides—two parallel lines reaching half way from the collar to the scutellum, two widely separated and diverging lines from the scutellum half way to the collar, a short line over the base of each wing, all these very obscure because of the hairiness of the mesonotum. Scutellum very small and rough; fovæ extremely minute and almost as lustreless as the scutellum. Abdomen black and shining. First segment two-thirds the entire length. Legs dark, shining brown, nearly black, but a trifle lighter at the joints. Wings hyaline, veins slender. Towards the base of the wings there is a smoky brown spot. Areolet medium size. Radial area open. Body 13, antennæ 07., wings 11.

**Andricus ignotus** n. sp.

A single female gall-fly of an unknown species appeared in a box of fresh galls of *A. pruinosis*, which, though not differing much in size, is certainly distinct from that species, or any other known to me.

Head black, vertex very finely punctate. Antennæ long, fourteen jointed, first large, broad at the apex, but with a remarkably small base, second ovate and placed like an egg in the deep cavity of the first, third nearly twice the length of the first two, fourth one-third, and the fifth one-half shorter than the third, the remaining joints nearly equal. Color one and two clear reddish brown, the

following from dark to dull brown, nearly black at the apex. Thorax black, space between the very deep parapsidal grooves elevated and shining, though minutely uneven or punctate between the parapsides, at the collar are two very black round spots. Scutellum small, finely uneven or rugose. Fovæ—if such they can be called—widely separated and hardly more than a less roughened and very shallow depression. Abdomen polished, black, first segment large and with a few extremely minute hairs on the sides of the anterior half of this segment. Legs clear, translucent brown. Wings large, faintly fuscous, hairy. Veins rather heavy. Areolet distinct. Cubitus disappearing close to the first transverse. Areolet open, angles at its base, one sharply acute, the other correspondingly obtuse. Body .09, wings .11, antennæ .07.

From East Rock, New Haven, Conn.

***Andricus exiguus* n. sp.**

Visiting West Rock, near New Haven, Conn., several years ago in June, I found among the dry but still adherent aments of *Q. obtusiloba* a number of very minute, dark colored, oval galls. The insects had escaped, but the species was new to me. Three or four years later I visited the locality in May and found galls in abundance, and the flies were very near maturity. I collected plenty of galls by breaking off small flower-covered branches. Placing these in water and keeping them under glass, a large number of very small gall-flies soon appeared. The galls were thin, short, oval larval cells, merely the modified sterile florets of the oak. Of galls affecting the sterile flowers of different kinds of oaks there are several species, but these were smaller and otherwise different from any I had seen. The effect of the sting of the fly was often to check the extension of the floral stems to a degree that reduced the florets to a close bunch or mass. This glomerate condition did not prevent the development of the gall-flies, and probably ten times as many flies appeared as there were galls in sight. These galls are hardly black, but rather of a very dark slate color; they are not quite smooth. In size they measure nearly .05 of an inch in length and almost .04 in breadth. The apex is bluntly pointed. They are so very thin shelled and brittle that it is almost impossible to remove one when dry from the ament to which it is attached. After rearing several thousand flies from these galls I noticed that there were at least two species in the box. They differed little in size or general appearance as viewed with the naked eye, but the magnifying glass showed that there were two genera. I examined the galls very carefully, but found but a single species, and from this the *Andricus* surely came, as I found a specimen in the unopened galls.

The other fly belonged to the genus *Neuroterus*. The new *Andriacus*, which I call *A. exiguus*, is described as follows:

Head black. Antennæ pale yellow, fourteen jointed, first joint large, second large, globular, third as long as one and two together and subclavate, the rest equal and of medium length, not quite as long as the third, the last is very minute. The apical joints—10, 11, 12, 13—slightly dusky. Thorax shining yellow. Parapsides small and distinct. Scutellum yellow, slightly rugose, bounded posteriorly by a heavy ridge. Fovæ round and deep and near together. Abdomen shining, yellowish brown. Legs pale yellow. Wings subhyaline. Veins pale brown. Areolet present but faint. Radial area open, broad. Cubitus slender, reaching three-fourths the distance to the first transverse.

*Female*.—Head black. Antennæ thirteen jointed, dusky brown, joints 3 to 10 are in dry specimens much shrunk and wrinkled. Wings not clear. Veins distinct. Accurate measurements hardly possible (See *Neuroterus exiguus* B.).

***Andriacus crystallinus* n. sp.**

I have received at different times from Mrs. E. H. King, of Napa City, Cala., a singular species of gall which grows in clusters on the leaves of *Q. agrifolia*? usually but not invariably on the under side. Full grown galls are from .30 in length to .13 in diameter, but only a few seem to reach maturity. Some are mere points. They are often quite dense clusters and remind one of our common *A. flocci* Walsh, by their woolly appearance, but the bright pinkish wool is resolved by the magnifier into a beautiful mass of brittle crystalline fibres. The largest galls terminate in an elongated neck, the lower half of which is generally smooth, while the upper part branches out tree-like. So far as I can discover these galls contain neither woody fibre nor cellulose tissue. They bear no resemblance to any ordinary vegetable growth; but the body of the gall and the crystalline frost-work that covers it have a clear, semi-transparency, more or less pinkish, like beautifully tinted glass. The galls have a strong astringent taste, and are nearly pure tannic acid. On opening two mature galls I found two dead but fully matured gall-flies. Each gall contains two chambers, one above the other, with a very thin partition between them. The larva matures in the lower chamber.

The female flies, of which I have two, are .10 in. in length.

Head black. Antennæ dark reddish brown; unfortunately the antennæ are broken, but the first joint is large, club shaped, second very short and oval, third as long as one and two together, fourth scarcely shorter than the third, the rest very little less in length. Thorax black and shining, but with rather stout scattered hairs along the usual parapsidal and median lines. Scutellum narrow, rounded and corrugate. Fovæ not distinct. Abdomen black and shining and without hairs. Legs dark reddish brown. Wings large; veins distinct but slender. Areolet small. Radial area open.

This species differs materially from *A. echinus* O. S., though the galls bear a close resemblance to that species as described by Baron Osten Sacken. The black body of the insect, and the entire absence of clouds or spots in the subhyaline wings seem to separate them specifically.

**Andricus Coxi** n. sp.

Galls.—Woody swellings on small branches of *Quercus virens*, sent me several years ago by the late Prof E. T. Cox from Arizona.

The largest galls I have are three-fourths of an inch in diameter, and are nearly two inches in length. They bear a very close resemblance to the galls of *Andricus Suttoni* B., but the insects are quite different.

The flies in my collection are all females.

Head and thorax brownish red. Antennæ fourteen jointed, first large, second one-half as long as the first, smaller, third two and one-half times as long as one and two together, fourth as long as one and two together, five to fourteen inclusive short and dull dusky red. Thorax microscopically punctate. Parapsides deep, smooth and somewhat darker than the general surface of the thorax. Scutellum finely punctate, separated from the thorax by a broad, shining groove, which is scarcely foveate. Abdomen dark, almost black. Legs pale, brownish red. Wings large, subhyaline. Veins very slender, pale brown. Areolet small. Radial area open; cubitus slender, but reaching to the first transverse.

This species is smaller and of a lighter color than *A. Suttoni* B., and the venation differs from that species.

**Andricus Ashmeadii** n. sp.

Of this remarkably distinct species I took nine females ovipositing in the buds of *Q. bicolor*, April 13, 1890. They are black, except the antennæ and legs, which are dark reddish brown. Head, thorax, antennæ and legs hairy; hairs short and appressed. Antennæ fourteen jointed, first rather long and hairy, second short and about as long as thick, third medium size and length, fourth two-thirds and the fifth one-half as long as the third, sixth and seventh short, and the apical seven very short, the last two joints less distinctly separate than the others, and in one specimen the suture in one antenna is quite distinct and absent in the other. In still another specimen the fourteenth joint has a distinct suture, but the two parts only equal the sutureless joint in ordinary individuals. I mention these irregularities, for had my description been founded on either of these erratic individuals, it would not have answered for what is, undoubtedly, the normal structure.

Thorax—parapsides fine, narrow, distinct and even throughout; intermediate parallel lines (not grooves in this case) reach half way to the scutellum; line over the base of each wing very faint. Thorax irregularly punctate; the scutellum more coarsely so and more hairy. Legs very dark reddish brown, almost black, except at the joints. Ungues simple. Abdomen polished, shining black, except where it is covered with white hairs. The parts not so covered are the dorsal and ventral portions of segments two, three and four. This forms on the dorsum a perfect shining triangle, whose base is on the anterior margin of the second segment, and whose apex is on the posterior margin of the fourth segment. Wings rather large and clear. Veins distinct but not heavy. Color brown. Areolet small. Radial area open. Cusitus not quite reaching the first transverse. Body .14, antennæ .10, wings .16.

I find no species nearly resembling this, except *Acraspis pezomachoides* O. S., and *Biorhiza hirta* B., both subapterous species.

Named for that most indefatigable Hymenopterist, William H. Ashmead.

### ***Amphibolips verna* n. sp.**

One female taken ovipositing in the buds of *Q. ilicifolia* April 9, 1897, in Waterbury, Conn.

Head small, rugose, dusky black. Antennæ same color, fourteen jointed, first joint long, heavy, second one-half as long as the first but full size, third a little longer than the first two together and very slightly curved, fourth two-thirds and the fifth one-half as long as the third, sixth to the thirteenth equal, fourteenth one-half longer than the thirteenth. Thorax and scutellum small, both rugose and thinly covered with short hairs. The parallel lines of the thorax extend more than half way to the scutellum. Parapsides very obscure, lines over the base of the wings rather less so, all small. Scutellum not prominent. Fovæ large, shallow and not smooth. Abdomen large, .10 of an inch long by .08 inch deep. Anterior of the first segment sparsely hairy, as is also the posterior margin of the terminal segment and the sheath of the ovipositor. Entire abdomen shining, but microscopically punctate. The legs a uniform dark red. Wings large, subfuscous; veins brownish red, not heavy. Radial area open. Areolet large and nearer the anterior border of the wing than in most species. Cubitus slender, reaching to the first transverse. Body .18, antennæ .10, wings .20.

This species is distinct from *Amphibolips ilicifoliæ* B., the only species hitherto found on this species of oak.

### ***Amphibolips longicornis* n. sp.**

Gall.—A large "oak-apple" with a very thin shell and a single larval cell in the middle of a soft, light and spongy mass, not unlike that of *A. spongifica* O. S. It is an inch and a half long and an inch and a quarter thick. My galls (only two) were received from Mr. W. R. Maxwell, of Palestine, Texas. Coming through the mail they were badly crushed and in such poor condition that I was

surprised, some months later, to find in the breeding cage a fine large gall-fly. Owing to my neglect it had been somewhat injured by mites. Species of oak unknown.

Gall-fly. *Male*.—Except the dull, opaque, brown antennæ the entire insect is black. Antennal joints fifteen, one and two equal, very short, second globular, third one and one-half times as long as the first two, fourth three-fourths as long as the third, fifth and following scarcely shorter than the fourth. Head small, shining black and corrugated. Thorax roughly ridged longitudinally. Parasides indistinct in the coarse corrugations. Scutellum very short and broad. Two prominent carinæ divide its dorsal surface into three equal, coarsely wrinkled parts. Fovæ large, round, deep and smooth. Abdomen small, very smooth, first segment (pedicel, ?) very short, second forms five-sixths of the entire length. Wings pale fuscous; veins distinct. Radial area open, short. Areolet small, a dark, brownish red cloud on it and the base of the radial area. Cubitus distinct and reaching to the first transverse. Legs broken. Body .16, antennæ .18, wings .17.

**Amphibolips Gainesi** n. sp.

Gall perfectly round and smooth, except the point of attachment to the acorn cup on which it grows. The point is small, it projects slightly and turns to one side. The color is pale brown, the outside not different in color or density from the hard cellular matter beneath. The larval cell is imbedded in, and is adherent to this mass. Size from one half to one inch in diameter. As my galls had wintered on the tree or lain upon the ground, the color of fresh galls may be different. Like *A. prunus* Walsh, this species develops on the edge of the acorn cup. It is larger than that species, which is dark and coarsely wrinkled when dry.

I think this new species grows on a variety of *Q. tinctoria*.

Gall-fly. *Female*.—Antennæ black, thirteen jointed, the joints moderately clavate, second very small and globular, the third equals in length the first and second together, the fourth is two-thirds as long as the third, the following joints gradually shorter to the thirteenth, which is long and faintly annulate. Head small, black; vertex coarsely corrugate. Thorax large, rounded, corrugate and microscopically hairy. Parapsides indistinct. Scutellum small, surface same as the mesonotum; fovæ small, near together, not shining or polished. Abdomen black; first segment one-third the entire length, basal one-half rather densely hairy, remainder beautifully and finely punctate, anterior border of the fifth segment with a few long white hairs. Sheath of the ovipositor with yellowish hairs. Legs small, short and reddish brown. Wings dark, smoky brown; veins heavy. Radial area open. Areolet small; veins enclosing it very broad and heavy, a very dark brown cloud on the apical portion of the wing. Body .27, antennæ .15, wings .24.

This fine species was received from President M. R. Gaines, Tilton College, Austin, Texas.

***Amphibolips badius* n. sp.**

Among the gall-flies that I captured at large is a female which I took from the terminal bud of the tallest shoot of a thrifty clump of white oak sprouts. It was almost beyond my reach and I failed to discover whether it was actually ovipositing or not, but it is safe to assume that it was, either had, or was about to do so. The capture was made in early Spring, before the buds had made any appreciable advance. It belongs to the genus *Amphibolips*, and quite distinct from the many other species of this genus in my collection.

Gall-fly.—Head, antennæ, thorax and legs dark brownish red. Head and thorax covered with short, appressed red hairs. Antennæ short, only half as long as the body, thirteen jointed, first joint short, second very short and globular, third one-third longer than the two preceding taken together, fourth one-third shorter than the third, fifth and sixth gradually shorter; joints 3, 4, 5 and 6 larger at the apex than at the base. Face covered with appressed hairs, and there is an obscure, converging line from the base of each antenna to the mouth. Head rather small, not broader than the thorax. Prothorax anteriorly a very narrow shining band. Mesothorax full and rounded in front, finely and evenly but rather sparsely punctate. Parapsides—and other lines very indistinct, mainly because of the short, dense and closely appressed hairs. These obscure completely the parapsides posteriorly. Scutellum small, rounded and slightly elevated posteriorly, and the hairiness coarser and more dense than on the mesothorax. Fovæ small, almost obsolete. Legs darker than the thorax, densely covered with short, fine and closely appressed hairs. Wings shining, dark smoky brown; veins dark, almost black. Areolet small but well defined. Cubitus disappears a short distance from the first transverse vein. Abdomen large, black and shining, the second segment dorsally very long, nearly concealing all the others, but retreating ventrally to less than one-half the dorsal length. The sides of this segment are covered with a dense patch of shining reddish hairs. Body .25, antennæ .13, wings .22.

***Acraspis Gillettei* n. sp.**

Galls three-tenths of an inch in diameter. Perfectly round, slightly uneven or pimply, each pimple crowned with a tuft of hair-like pubescence. They are of a pale ash gray color, but brown or black if long exposed to the weather. The larval cell is central and is kept in place by a spongy mass that is loosely fibrous on the inner surface of the gall. The cell is oval, .15 by .18. The shell very thin and hard. The galls affect the leaves of *Q. alba*, and, as a rule, the tops of tall old trees. They are rarely abundant, but occasionally occur in great numbers on an isolated tree or a small grove of oaks. I took this species at first for *A. niger* Gill., but it differs from that species in several particulars.

Gall-fly. *Female*.—Head, antennæ, thorax and legs dark, reddish brown. Antennæ fourteen jointed, the first and second large, the second three-fourths the length of the first, the third one and one-half the length of one and two together, the fourth equal to one and two together, and one-half as long as the third, sixth to the thirteenth equal, fourteenth pointed, short and only half as long as the thirteenth. Head short and broad; vertex hairy. Mesonotum small, narrow and hairy, though in some individuals shining and without hairs on the vertex. Collare very narrow and obscure, and with dense, fine, white hairs, and the anterior border of the mesonotum apparently depressed. Parapsides present but indistinct. Median lines absent. Scutellum small, hairy, hairs longer than on the mesothorax. Fovæ wanting. Abdomen large, shining black, second segment with fine microscopic hairs on the sides anteriorly. The abdominal segments are distinct and gradually shorter from the second, all compressed on the sides. Anal segment with a tuft of long hairs. Legs dusky and more decidedly reddish brown than the other parts of the body. Body .13, antennæ .11, rudimentary wings .05. These last are longer than in most supapterous species. No males.

Named for the Hon. Charles W. Gillette, for many years my genial companion in many an entomological ramble, and who collected the galls from which my specimens were bred from the ground beneath a large white oak on his lawn.

***Callirhytis ceropteroides* n. sp.**

Galls.—Slight enlargements of base of the annual growths of the shoots of *Q. tinctoria*. These swellings are often so inconspicuous that it is very difficult to distinguish them from the unaffected branches. Occasionally one is so developed as to attract notice. They are polythalamous, though only a few insects are found in even the largest. Found in July at Crescent Beach, Branford, Conn.

Gall-fly. *Female*.—Head shining, blackish brown, but with extremely minute hairs and a fine wrinkled surface on the vertex. Antennæ thirteen jointed, first and second large and nearly equal in size, third one-fourth less in length than the first two, fourth nearly as long as the third, and the following nearly equal in length and, in color, all are a dull brownish red to a darker shade towards the apex. Thorax black, shining but evenly transversely wrinkled, pleuræ and collare punctate. Parapsides converging from the collare to the scutellum. The parallel intermediate lines extend half way from the collare, a line over the base of each wing, all poorly defined, being merely faint depressions breaking the surface into longitudinal ridges. Scutellum smoother than the mesonotum. Fovæ large but shallow. Abdomen smooth, shining brown. Legs dark brown. Wings hyaline, and the veins so faint and colorless as to make definition impossible, even under a strong magnifier. Body .08, antennæ .06, wings .08.

Six bred specimens—all females.

***Diastrophus niger* n. sp.**

I have had in hand for several years a few galls collected at



Wood's Holl from *Potentilla canadense*, by Miss Cora H. Clarke. They differ greatly in form and size, but I did not think the variations were specific and placed them together in the breeding box. The smallest are round or oval, not larger than the smallest peppercorn, and contains not more than one or two larval cells; while the largest are an inch long and one-fourth of an inch in diameter, and involve the whole stem and contain a dozen or more larval cells. Were the insects identical the form of the galls would not suggest any specific difference. When the large galls include a joint of the plant the joint is enlarged with the rest, but auxillary buds are not affected. In this it differs from *D. potentillæ* Bass., which affects the buds only and whose galls are monothalamous.

Cynipideous galls resembling the larger form are occasionally seen on the petioles of strawberry leaves, but I have never been able to rear any flies from them. From these I have bred both sexes, and after many attempts to settle the question of species I am always forced to the conclusion that there are really two species, though I can offer no very strong facts to support it. The large females, which I name *D. niger* Bass., are:

Body entirely black and shining. The head is short and broad and finely punctate. The antennæ thirteen jointed, the first and second reddish brown, the second very short, the others, including the first, all of moderate and uniform length. Thorax smooth, shining. Parapsidal grooves very deep and distinct. No other lines on the thorax. The mesothorax bounded posteriorly by a sharp transverse ridge. Scutellum medium size, rugose, hardly bi-foveate, though there is a scarcely discernible line dividing the large shining basal pit. Abdomen shining black, and of moderate size. The sheath of the ovipositor clear, translucent brown. Legs dark brown. Wings hyaline; veins dark, the first and second transverse heavy. Radial area short, broad and open, and with a dark cloud at its base. Areolet wanting. Cubitus heavy and thickest at its union with the first transverse. Body .08, antennæ .06, wings .10.

Seven specimens.

#### **Diastrophus minimus** n. sp.

Galls small, globular or oval blisters rising abruptly between the nodes of the potentillæ stems. They are not often more than .06 inch in diameter and contain one or two larval cells. They are dark and smooth.

Gall-flies. *Females*.—Black, except the legs which are a pale reddish brown. Thirteen joints, first and second ovate, third straight, remaining joints short and of uniform length. Thorax smooth and shining. Parapsides closely convergent posteriorly. Scutellum medium size. Fovæ large, shining and rather shallow. Surface of the scutellum finely and regularly rugose. Abdomen smooth and

shining. Wings very faintly dusky; veins strong, very dark and well defined. Areolet subobsolete. Cubitus reaches the first transverse. Radial area open. Vein at its base (second transverse) very dark and thick. Body .06, antennæ .06, wings .07.

*Male*.—Antennæ fourteen jointed. Legs a shade lighter yellowish brown than the female. Otherwise as the female, except the smaller size. Body .05, antennæ .05, wings .07.

I may add that my collection contains one branch of *potentilla* on which I find a gall of the above species and, at the node, one of *D. potentillæ* B.

***Dryophanta discus* n. sp.**

Galls.—Among the galls sent me several years ago by Mrs E. H. King, from Napa City, Cal., were a few specimens from which no insects appeared, but from which I removed three dead but perfectly developed individuals. The galls were circular, flat sessile disks growing in clusters on the under sides of the leaves of some species of oak, closely resembling *Q. alba*; but I am not sure this oak grows in that section. The galls are hardly one-eighth of an inch in diameter, and except in size and color might be taken for what is, I think, called the blue spangle gall, not uncommon on the white oak in the Atlantic States. It is smaller and lacks the blue color.

The shape suggests the trivial name.

Head black. Antennæ thirteen jointed, joints one and two rather large, subequal. Third long, fourth two-thirds as long as the third, remainder gradually shorter, all yellowish red. Thorax smooth, shining, with a few scattered hairs and deep parapsidal grooves. Scutellum slightly rugose. Fovæ not distinct. Abdomen dark, shining brown. Legs dark brown. Wings rather large; veins very pale, almost colorless. Areolet wanting. Cubitus nearly obsolete. Radial area open. Body .06, antennæ .05, wings .07.

Three specimens.

***Dryophanta parvula* n. sp.**

I found this minute species, of which I have but a single specimen, ovipositing in the buds of *Q. ilicifolia*, May 26, 1871.

Gall-fly.—Entire body black. Head a little broader than the thorax. Antennæ thirteen jointed, first joint large, short and dark, second large, globose and equaling the first in length, third rather long and slender, remaining joints equal in length, two to eleven yellowish brown, twelve and thirteen dark, dusky brown. Thorax—the two median lines, which extend two thirds the distance from the collare to the scutellum, the parapsides and the lines at the base of each wing are all smooth and shining. The parapsides are not broad, and they converge closely at the scutellum. Scutellum finely wrinkled or rugose. Fovæ wanting. Abdo-

men polished and shining. Legs dark, translucent brown. Wings hyaline; veins faint and slender. Radial area open, broader than usual. Areolet wanting. Body .05, antennæ .05, wings .07.

***Dryophanta longicornis* n. sp.**

Among the galls from which *Andricus exiguus* n. sp. and *Neuroterus exiguus* n. sp. were bred were three or four of an altogether different sort. They were moderate enlargements of the upper portion of very young and tender shoots, not at all prominent; and now that these shoots are dry and shrunken I am not able to indentify them among the galls in the box. I did not separate them at the time, supposing them to be too immature for developing, and I could not have done so without injuring the other species. Of course I am not sure that the three large flies found in the box came from these galls, but the presumption is that they did so. At any rate, the flies are of an undescribed species, and their relation may be determined later.

Gall-fly. *Male*.—Head black. Antennæ long, fifteen jointed, first and second short, globose and of equal length, third is one-third longer than the first two, fourth equal to the first two, fifth almost equal to the fourth, the following gradually shorter, and all of a dark brown color. Thorax black and shining in that portion within the deep parapsidal grooves. Median and alar lines wanting. Scutellum coarsely rugose and with short, scattered hairs. Fovæ obsolete, but a slight depression takes their place, this is rough like the rest of the scutellum. Abdomen black and smooth. Legs rather pale red or reddish brown. Wings large and smoky brown; veins all distinct and reddish brown. Radial area open. Areolet present. Cubitus full length, but slender towards the first transverse. Body .09, antennæ .11, wings .12.

*Female*.—Body .10, antennæ .11, wings .12.

Two males and one female.

***Dryophanta pallipes* n. sp.**

Galls.—The rapid Spring growth of thrifty young white oak shoots is sometimes suddenly checked by the appearance of this gall at their apex. The gall does not prevent the development of the leaves below it, but immediately surrounding its base half a dozen or more brown, thread-like bodies from three-fourths of an inch to an inch and a half in length appear. Occasionally two or more of these are narrowly strapped shape, and suggest that they are all undeveloped leaves. The gall, a mere larval cell at the center of this cluster, is blackish brown, thin shelled, oblong-oval, .09 of an inch in length and .06 in diameter. The insect emerges from the apex of the cell, leaving it resembling an eggshell with

the end removed. This is a rare species, though I have found it in a certain locality several years.

Gall-fly. *Male*.—Body black. Head finely wrinkled, wider than the thorax. Antennæ fifteen jointed, first joint smaller than the second, club shaped, second globose, both pale, third to the fifteenth changing gradually from pale to a dark dusky brown. Thorax—the parapsides very distinct, closely converging at the scutellum. The space between these lines is polished and smooth and outside finely punctate. Scutellum rather coarsely rugose; foveæ wanting. Abdomen petiolate, compressed, shining black. Legs very pale brownish yellow. Wings subfuscous; veins heavy reddish brown. Radial vein heavy and ending very abruptly within the margin of the wing. Areolet distinct. Cubitus heavy, reaching the first transverse.

*Females*.—Both broken. The antennæ paler and the joints shorter than the male, and the abdomen is below the average size in this genus. Body .09, antennæ .08, wings .09.

Waterbury, Conn. One male and two female specimens.

**Holcaspis fasciata** n. sp.

For nearly forty years the gall of the fine species I now describe has been a familiar object in my entomological rambles, and during that time but few years passed that I did not make some effort to rear the gall-flies. Two years ago I succeeded in doing this, and I have before me a large number of fully developed insects.

The galls are found almost every year in September on the thrifty Summer growth of *Quercus ilicifolia*. They are arranged in linear clusters near the tips of the shoots, somewhat after the manner of *H. duricoria*. During their growth they are mottled light and dark green color, and these spots often are arranged in broad bands that suggest the trivial name. When full grown they range from one-fourth to one-half an inch in diameter. They are nearly but not exactly round. When fully grown they drop to the ground at a touch, and their pretty appearance soon changes to a dull black.

The large larval cell is imbedded in a fine cellular substance that, in ripe galls, is of a deep tan color. Measured from the base to the tip of the cell it is .45 of an inch long, and across the widest part towards the base .37 in large specimens. When collected I immediately placed the galls on the ground in a condition as nearly normal as possible. At this time there were no larvæ in the galls, but in the exact centre a minute viscid point that seemed a mere speck of jelly. There was, certainly, nothing that looked like an organism, even under a strong magnifier. In the course of the Autumn the

dot of jelly developed into a larvæ that by Winter reached full development. I watched them through the next Spring and Summer, and towards September had the pleasure of finding mature imagoes in the breeding box.

The flies, all females, are a remarkably large and strong species.

The head small and of a yellowish brown color. The face smooth and a shade lighter than the cheeks and vertex. The antennæ has fourteen joints, and is a dusky brown throughout, and the annulations are so close as to be counted with difficulty, the first joint is rather stout, the second quite small and oval, the third a trifle longer than one and two together, the remaining of uniform length. The thorax is large, shining and almost black. It seems smooth under an ordinary low-power glass, but a high power shows it to very finely and most beautifully cracked. The parapsidal grooves are deep and broad. The scutellum is not large but is very deeply wrinkled or corrugated. The fovæ are large and not distinct. The abdomen is very large, and vertically, unusually deep. There are a few small hairs on the shoulder of the anterior segment. The legs are brownish red. The wings are subhyaline; the veins rather heavy and quite distinct. The areolet present. The cubitus reaches to the first transverse, and the radial area is open. Body .18, antennæ .12, wings .18.

***Loxaulus spicatus* n. sp.**

Galls.—A cluster of galls attached to a small branch of some variety of *Quercus virens*. They are a dark reddish brown and resemble more nearly, than anything else I can think of, a rather irregular shaped nubbin of red dent corn. There are twenty-five or thirty galls in the cluster, and it measures about an inch in diameter. The larval cell is imbedded in the base of each separate gall in a dry cellular tissue, and in this it somewhat resembles the chit in the kernel of corn.

My galls have been in hand many years, having been collected in Arizona by the late Prof. E. T. Cox. How this fine and distinct species escaped my attention so long I cannot tell.

Gall-fly.—Color brownish red. Head paler than the thorax. Antennæ thirteen jointed, first short, second almost globose, thirteenth longer than one and two together, it is slender and club shaped, fourth and following of uniform length and very distinctly defined and heavier than the third. Head broader behind the eyes. Ocelli black, middle one less distinct than the lateral. Thorax heavy. Parapsides obscure. Two faint, parallel median lines reach from the collar one-third of the distance to the scutellum. Scutellum small, rounded, hairy. Fovæ very small. Abdomen highly polished, shining, dark brown, basal segment with a few scattered hairs on the anterior portion. Legs dull reddish brown. Tibia and tarsi more dusky. Wings subhyaline, microscopically hairy; veins pale brown. Areolet rather small. Cubitus reaches just half way to the first transverse. Radial area open. Radial vein ends abruptly before reaching the margin. Body .10, antennæ .09, wings .12.

Six specimens, all females.

**Neuroterus umbilicatus** n. sp.

The galls of this species are found in great numbers on the under surface of the leaves of *Q. bicolor*. Four or five hundred have been counted on a single leaf. They are small, circular, flattened and concave, with a minute conical elevation in the centre of the concavity. They are about .07 of an inch across and .05 in depth, and the pit is only .04 across. Beneath the conical elevation lies the minute larval cell. Except the concavity described, which is smooth, the surface is covered with short, stiff hairs, much like the under surface of the leaf. The galls are easily detached, but leave an indentation which is seen as a flattened elevation on the upper surface of the leaf. The peculiar form of these galls suggests the trivial name.

The gall-flies are all females, and the entire body is shining black and highly polished.

Antennæ short and very slender, except the first and second joints which are very thick, the second quite as thick as the first, but a little shorter and less tapering towards the base, the remaining are very slender, the third as long as one and two together, the others (4 to 13) short, subequal, the last three forming a thickened club with obscure articulations. The polished thorax without hair or grooves. The scutellum small. The fovæ wanting. Abdomen as deep as long, and in shape subtriangular, like most of the species of this genus. Legs clear, dark, shining brown, and in some individuals nearly black, and in all cases lighter at the joints. Wings hairy; veins pale. Areolet small but distinct. Radial area open, long and narrow and forming at its base with the second transverse a perfect parallelogram. Cubitus slender, equal throughout, and reaching quite to the first transverse. The first quite dark brown, the other veins pale or colorless. Body .06, antennæ .04, wings .07.

Described from twenty-five specimens in my collection.

I collected these galls in countless numbers for many years, and made numerous unsuccessful attempts to rear gall flies from them. Flies in vast numbers were bred from them, but all bore the unmistakable marks of *cynipideous parasites*. These repeated failures led me to wonder if there might not be, after all, species bearing all the characters of the parasites that were true gall makers. It is true that I knew of no such species, and I did not forget that proof of this negative sort and hardly less in amount led Dr. Fitch to publish a winged parasite as the originator of his *Cynips ficus* galls, which, later, Dr. Walsh discovered were produced by the subapterous *Biorhiza forticornis*. I, too, had reared millions of parasites from the galls *Neuroterus floccosus* B. before a single gall fly was discovered. Visiting on a warm morning in Spring an oak that

had for years furnished these galls in abundance, I found a species of *Neuroterus* laying eggs in the buds of this tree. Busy capturing specimens from the low branches of the tree it was sometime before I discovered that my clothing was covered with flies of the same species. Having but a few minutes left for collecting, I was only able to collect some thirty individuals from the buds and my clothing. I left unwillingly, to return in the afternoon. By afternoon the weather had turned cold and not an insect of any kind could be found.

I made visits later and on more favorable days, but no flies were seen. On one of these visits I took up a quantity of sand and leaf-mould under the tree, and sifting it carefully found many empty galls and two that contained perfect living gall-flies. One of these I destroyed in opening, the other proved to be identical with those captured a few days before, and from it the above description is, for the most part, drawn.

In the latter part of May and the beginning of June the young galls were nearly full grown and as abundant as ever before. At this time I had in my breeding boxes, in damp earth, galls of this sort gathered the Autumn before, and from them were appearing parasites in considerable numbers. Visiting the tree at this time I found from one to five of these flies actively at work among the umbilicus galls. I cannot say that I actually saw them stinging the galls, but we may reasonably suppose they were doing so, and it is easy to understand why so few gall-flies are so produced from the almost countless number of galls of this and some other species. I have seen parasitic hymenoptera stinging, but not often. My favorite oak has recently been cut down and a railroad siding covers the stump, but I hope to find another as good on which to follow up my investigations.

***Neuroterus tectus* n. sp.**

I found, April 29, 1874, eight or ten gall-flies belonging to the genus *Neuroterus* ovipositing in the buds of a low spreading bush of *Q. prinoides*.

The description is as follows:

Head black. Antennæ thirteen jointed, first and second short, third equal to the first two, fourth two-thirds as long as the third, the following short, subequal to the thirteenth which is very short. Thorax black and smooth; parapsides none. Scutellum small, rounded, polished and separated from the mesothorax by a broad, arcuate groove. Abdomen black, small, in outline an equi-

lateral triangle. Legs a clear pale translucent brown at the joint, changing to an almost glassy black in the middle of the femur and tibia. Wings hyaline, veins dark, distinct, but not heavy. Radial area long and narrow and open. Areolet relatively large. Cubitus full length. Body .05, antennæ .05, wings .06.

Visiting the same bush, June 10th, I found numerous galls in the shape of an enlargement of the base of the young branches. In some cases the galls hardly increased the size of the branch or interfered with its growth; in others it entirely checked its extension.

The insects, which had been very numerous, had mostly left, but from the galls I collected I bred at least a hundred flies—male and female. The females do not differ in any material feature from those taken ovipositing.

*Male*.—Head, thorax and abdomen shining black. Antennæ slender, fourteen jointed, first and second short, third one-third longer than the first two, fourth equal to one and two together, fifth to thirteenth equal, fourteenth short. Color a clearer shining brown than in the female antennæ.

From Waterbury, Conn.

***Neuroterus perminimus* n. sp.**

This is the smallest species from which I have ever reared any gall-flies. They lie imbedded in the lamina of white oak leaves, and show on both sides, but more distinctly on the upper side. They are oval, pustule like bodies, only .04 long, .03 wide and .03 deep. I have only met them in a limited locality in Rockport, Ohio. In some cases two hundred can be counted on a single leaf of ordinary size. Small as they are, they are so infested with parasites that comparatively few true gall-flies ever reach maturity. I have reared a few of both sexes. The galls reach their growth about June 25th, and the flies hatch out before July 10th.

*Female*.—Head black. Antennæ thirteen jointed, first and second joints rather large, the rest short and dusky brown. Thorax very dark, almost black. No parapsidal lines. Scutellum very small and somewhat rough. No foveæ. Abdomen short and black. Legs translucent brown but paler at the joints. Wings hyaline; veins small but distinct. Areolet very small. Radial area long, narrow and open.

*Male*.—Head dark but not quite black. Antennæ fourteen jointed. Thorax highly polished and a fine dark brown. Abdomen very minute, slender, pedicelled and triangular and a reddish brown. Legs pale and almost glassy in appearance. Body .03, antennæ .03, wings .04.

NOTE.—I have received within a week fresh galls of this species, but the flies had nearly all escaped on their arrival, June 28, 1900.

***Neuroterus exiguissimus* n. sp.**

Galls found in Autumn on the underside of leaves of *Q. alba*,



arranged along the sides of the midvein or principal veins, closely sessile but not easily separable from them, and showing an indentation in the lamina of the leaf where they grow, and a small, smooth elevation on the opposite side. They are hairy or coarsely flocculent, like the galls of *N. floccosus* B. The lateral diameter is about .10 of an inch; the vertical .05. Denuded of the dense woolly covering the gall, which is the larval cell, is smooth, hemispherical (sometimes oval) and .03 in the lateral diameter. They chiefly affect the leaves at the ends of young oak branches. These leaves are generally curled and distorted, though this does not seem to result from the attacks of the gall insect. I have these galls from Providence, R. I., and Amherst, Mass., and for several years past I have found them quite abundant in Waterbury, Conn. They resemble, individually, the galls of *N. floccosus* B., but are smaller and are confined to the large veins of the leaf, mostly to the midvein, and they grow on *Q. alba*, while *N. floccosus* is found on *Q. bicolor*.

All the gall-flies I have reared are females.

The head is broad and black. The antennæ thirteen jointed, first and second joints are black, the third to the thirteenth dusky brown, slender and of equal length, the first joint is short, the second larger and ovoid. The thorax smooth. The scutellum smooth, shining, a curved groove, but no foveæ at its base. The scutellum is smoother and more polished than the mesonotum—this is unusual, if not unique. Abdomen compressed, smooth and black. Legs dark brown, with pale joints. Tarsi dusky. Ungues black. Wings large, hyaline; veins pale. Cubitus slender, not easily traceable. Areolet large, but the veins bounding it laterally scarcely visible. Radial area open. Body .05, antennæ .04, wings .04.

While there is a close resemblance between this species and *N. floccosus* B., I hesitate to pronounce the differences merely varietal. I do not care to become a species maker, founding new species on slight variation; but until the history of our Cynipidæ is better known, it will be impossible to determine, in some cases, what are true species and what are only varieties.

#### ***Neuroterus exiguus* n. sp.**

After the discovery of a species of *Neuroterus* in my boxes of *Andricus exiguus*, I made at least three trips to West Rock to discover the home of the new species, sure that the galls of the two were not identical. The study of an unlimited amount of material revealed aments that were of abnormal size, some of them two or three times the ordinary diameter, some with nodular enlargements, but all more or less hidden in the florets. After repeated efforts I finally found some of the *Neuroteri* in these galls and the mystery

was solved. These galls are so small and succulent that they soon shrivel up and disappear. When once found it was easy to discover them in considerable numbers, but even now I fail to detect them among bunches of dry *Andricus* galls.

The flies are described as follows :

*Female*.—Head large. Antennæ thirteen jointed, first large, ovate, second much smaller, third equal to the first two, they are of uniform length, very short, color clear, semi-translucent brown, all except the first two very slender and easily broken, and often presenting a shrunken appearance. Thorax relatively large, polished, very black, the surface is rumpled owing to its extreme thinness, no two specimens being alike in this respect. Scutellum small, rounded, shining black, as is also the transverse groove at its base, this groove is large and incurved. Abdomen small, black, less brilliant than the thorax, triangular through the retraction of all the segments within the first. Legs dark, clear brown but paler at the joints. Wings large, smoky and hairy; veins large and strong. Areolet large. Cubitus reaching quite to the first transverse. Radial area open. By a curvative in the second transverse at the base of the areolet, the outer angle is acute and the inner a right angle. In most of the species of this genus they are both right angles. Body .06, antennæ .04, wings .07.

*Male*.—Black, except the antennæ and legs. Antennæ fifteen jointed, all clear brown and very frail and slender, except the first two. Legs same color as the antennæ though a little paler at the joints. The whole insect frail and delicate. The abdomen long pedicellate, shining brown. Wings as in the female. Body .06, antennæ .05, wings .07.

### ***Neuroterus Gillettei* n. sp.**

Gall.—A pustule like enlargement of the petioles and mid-veins of the leaves of *Quercus obtusiloba*. Polythalamous and quite irregular in size and form.

My dry specimens are much shrunken and distorted.

Gall-fly. *Male*.—Head black. Antennæ fourteen jointed, first joint short and obscure, brownish, second large, ovate, almost colorless, third long and slender, all except the first joint more or less translucent, fourth to the fourteenth very short. Thorax rounded, shining black. Parapsides—as in all of this genus—wholly absent. Scutellum beautifully polished, black, separated from the mesonotum by a broad, shining groove. Abdomen petiolate, petiole pale or colorless, following segments dark. The abdomen is small and triangular. The legs are nearly colorless. Wings large, hairy and somewhat dusky; veins all very distinct, yellowish brown. Areolet large. Radial area long, open. Cubitus reaches in full size to the first transverse vein. Body .05, antennæ ?, wings .07.

*Female*.—Antennæ thirteen jointed. Abdomen smaller than is usual in the females of this genus. No petiole. Legs pale, with shining, translucent brown in the middle of the femur and tibia. The female measures the same, even in the wings.

Named for Prof. C. P. Gillette, of Fort Collins, Colorado, whose studies have so greatly augmented our knowledge of American Cynipidæ.

**Neuroterus fragilis** n. sp.

Galls.—They resemble in form and structure the galls of *N. irregularis* O. S. and *N. majalis* Bass., but are much smaller and of greater density than either of these species. They are a pale yellowish white and occur on the leaves of a small oak in southern California, probably *Q. virens* or a related species. The galls are polythalamous, but even the largest contain very few individuals.

Gall-fly. *Male* and *female*.—Color pale translucent brown, except the minute abdomen which is dusky brown. Abdomen very long, pedicellate, the remaining segments forming a minute, equilateral triangle. Legs very pale and slender. Wings subhyaline; veins very distinct but small. Areolet present. Radial area open. Antennæ of the eight males in my collection all broken at the first or second joint. The female antennæ has fourteen joints, the first small and short, second relatively very large, the following very short. Body .05, wings .08.

A very minute species and differing materially from all others of this genus known to me.

Collected at or near San Diego, Cal., by Mrs. D. B. Hamilton.

**Neuroterus consimilis** n. sp.

Gall.—Leafy and greatly foreshortened and enlarged branchlets of the white oak. Of solid, woody texture, polythalamous, one-half an inch thick (dry specimens), and three-fourths of an inch long. They mature in mid-Summer.

Gall-fly. *Male*.—Head shining black, broader than the thorax. Antennæ fifteen jointed, longer than the body, first and second joints short, the second globose, those following nearly equal in length, dull dusky brown. Thorax and scutellum dull black, microscopically punctate. Parapsides reduced to two brief divergent lines beginning on the scutellum. Groove separating the mesonotum from the scutellum broad and shining in the middle, but no distinct foveæ. Scutellum small. Abdomen extremely small, very black. Legs—posterior pair dark, nearly black, except at the joints, middle and the anterior pairs a uniform dull yellowish brown. Wings hyaline; veins very dark and well defined. Areolet small. Radial area open. Body .06, antennæ .08, wings .08.

*Female*.—Body black. Antennæ in my four specimens are broken. The basal joints, which still remain, darker than those of the male. Thorax—parapsides wanting. Foveæ absent, but the transverse groove rather broad and smooth. Abdomen black, large, the terminal segments retracted within the first, which is vertically very wide or deep. The posterior pair of legs are even darker than those of the male. Wings same as the male. Body .08, antennæ .07, wings .09.

Four females, two males. Waterbury, Conn.

**Neuroterus dubia** n. sp.

This species was found in a box of galls of *A. prionosus*, but no galls appear from which they seem to have come. Both sexes.

*Female*.—Black. Head—vertex microscopically crackled. Antennæ fourteen jointed, joints one and two equal in length and size, rather large, third slender and one and one-fourth as long as the first two, fourth short, about two-thirds as long as the third, the remaining very short, the fourteenth very minute and the suture indistinct, joints one, two, three and four pale yellowish red, the remaining dusky reddish brown. Thorax high and rounded, hardly smooth, but shining. Two diverging grooves from the scutellum to the base of the wings. Scutellum finely and evenly rugose. No fovæ, but a broad groove separates the thorax and the scutellum, broadest in the centre. Abdomen shrunken in dry specimens, but smooth and shining and vertically deeper than long. Legs pale yellowish. Wings subfuscous; veins slender, distinct. Radial area open. Areolet relatively large. Body .06, antennæ .06, wings .08.

*Male*.—Antennæ fifteen jointed, joints one and two rather shorter than in the female, and the first, at the base, dark and shining, third long and pale yellowish brown and semi-translucent, the remaining joints short and of a very dark opaque brown. In no other species have I noticed the sudden transition of color seen in this. Head, thorax, scutellum and the minute, long, pedicelled abdomen dull shining black. Legs pale, but less so than in the female, inclining to yellow. Wings as in the female. Body .06, antennæ .06, wings .08.

Five male and three female specimens.

***Neuroterus distortus* n. sp.**

The galls are young branchlets of *Q. bicolor*, slightly enlarged at the base and scarcely distinguishable from ordinary twigs. The enlargements about half an inch long, leafy, polythalamous, the leaves often curled and distorted, and the twig dwarfed in length and turned to one side. They are so inconspicuous that they would escape notice were it not for the rosette-like cluster of leaves surrounding them. My specimens, collected in considerable numbers from a single tree, bear date May 25, 1893. The largest galls produced about a dozen insects.

*Male*.—Except the antennæ and legs smooth, shining black. Antennæ fourteen jointed, joints one and two of moderate size and length, third equal to the first two, fourth two-thirds as long as the third, fifth to the twelfth equal, thirteenth short, fourteenth very short, all dusky brown. Thorax high, smooth and rounded. Scutellum rounded and perfectly smooth, separated from the mesothorax by a deep, shining groove. Abdomen with a slender petiole. The following segments, seen laterally, form a globular disk, the length and breadth being equal. Legs clear, pale brown, the middle of the femur darker but almost transparent, and paler at the joints. Wings large, subhyaline; veins pale, clear brown, all distinct and complete and of equal size. Areolet large. Radial area long and narrow. Body .06, antennæ .05, wings .08.

*Female*.—Black. Antennæ thirteen jointed and as in the male, except that the third is shorter and the whole a shade darker, and the abdomen is not petiolate. Body .06, antennæ .05, wings .07.